

意識下に戻し、客観的に生活を見直すことを目的としている。そして、活動的なライフスタイルを身につけるための工夫や食習慣を改善する工夫などを助言し、参加者が自ら気づき、考え、行動することで望ましい生活習慣が根付くことを期待した。

(7) その他

本教室は中高年者を対象としているため、特に安全面について常に配慮しなければならない。参加者の持病や性格、その日の体調などを確認し、教室中も目を配ることが重要である。事故の発生に備えて予め保険に加入することが望ましい。また、水分補給の重要性についても指導し、参加者自ら水分を持参して、運動の前中後、温泉入浴前後とこまめに補給し、日常生活でも習慣化できるよう促した。会場までの交通手段のない参加者に

は、送迎を実施した。

また、この他にも調理実習やマレットゴルフ(図8)、水中運動にアクアビクスを加え、より充実した指導内容となった。

なお、本教室は身体教育医学研究所の倫理審査委員会において、承認を受け実施した。

3. 参加者の感想

教室終了時の参加者の感想を表2にまとめた。

4. 考察および今後の課題

(1) 運動・生活習慣の維持、継続

教室終了後、望ましい生活習慣を維持し、継続しているかは現在調査中であるが、教室参加修了者のなかには、類似の教室へ参加している者、運動指導者の指導のもとサークル活動を実施してい

ゆったり温泉健康教室

わたしの体重と歩数の記録表

名前 Y.K 68才

体重測定と歩数計測も始めてみましょう。

ダイエット中であることをはっきりと意識するために、このグラフをいつも目につく所に貼ります。でも、体重の変化には一喜一憂しないよう気を付け、生活習慣の改善に目を向けましょう。

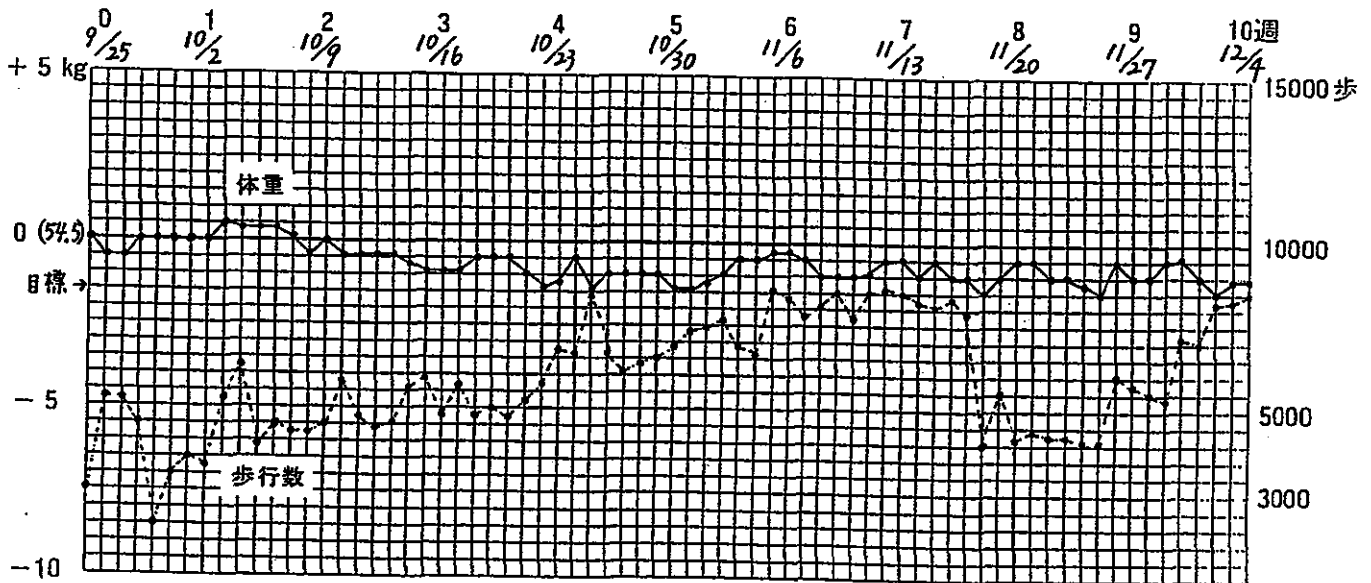


図7 体重と歩行数の記録表

大野 誠 著：やせる医学百科より引用



図8 マレットゴルフの様子

る者も多い。しかし、特別な時間や場所で運動するだけでなく、日常生活をいかに活動的に過ごし

ているか、望ましい生活習慣を意識しているかが重要である。

そのために生活・運動指導の内容プログラムは、知識や情報を伝える講話・実技指導だけでなく、参加者が自らの生活習慣を見直し、気づき、考え、行動するように具体的に導き、促していくことが望ましい生活習慣を継続させるためにも必要だと考えられる。

#### (2) 参加導入へのきっかけ

今回は中高年女性と限定して教室を開催したが、今後、中高年男性、青壮年にも応用できる指導内容プログラムでもある。そのためには、時間帯、時期、託児、参加費、周知なども考慮に入れて検討していく必要がある。また、教室に参加してい

表2 教室終了時の参加者の感想

#### ① 精神心理的な事柄

- ・ 気持ちが前向きになった、元気になった
- ・ からだを動かすことに喜び、楽しみ、気持ち良さを感じるようになった
- ・ 生活習慣に気をつけるようになった
- ・ 家族や友達に学んだことをわけてあげたい気分
- ・ 老化は悲しく哀れなものと感じていたが、いたわることの大切さを学んだ
- ・ 元気な年寄りになるいいきっかけづくりとなった
- ・ からだは老化していくことを実感、今から少しずつ体力をつけていきたい
- ・ 人生のプラスになった
- ・ 教室が終了すると、もとの生活に戻りそう
- ・ 少しでも体重が落ちればと思ったがだめだった

#### ② 身体的な事柄

- ・ 疲れにくくなった
- ・ 膝、腰、肩痛がらくになった
- ・ 体重は減らなかつたけれど、からだの動きが軽く、スムーズになった
- ・ 足の筋肉、腹筋がついてきた
- ・ からだが柔らかくなった
- ・ 汗をよくかくようになった
- ・ 姿勢に気をつけるようになった

#### ③ 教室の評価

- ・ 内容もバラエティーに富んでいて、毎週が楽しみで待ち遠しかった
- ・ 経験したことのない運動も楽しくできた
- ・ 友達もたくさんでき、年代を超えた付き合いができた
- ・ 家族的な雰囲気良かった
- ・ もっと教室を続けたい
- ・ スタッフが明るく、受容的だった

#### ④ 温泉について

- ・ 運動の後の温泉は最高でした
- ・ 温泉はめんどくさくて敬遠しがちだったが、大好きになった
- ・ 昼間の入浴は疲れてしまい、からだに合わなかつた
- ・ 近くにある温泉をもっと利用したい
- ・ 家庭風呂の温度も気をつけるようになった
- ・ 温泉入浴の仕方も勉強になった

る者の特徴として、比較的健康意識の高い者が多く、本来参加してほしい健康意識の低い者へのきっかけとして「温泉」を活用していくことは有効な手段になると考えられる。

### (3) 課題点

本研究では、生活・運動指導がバラエティーに富んだ内容であり、それぞれ専門的な知識と技術を持ち合わせたスタッフを揃えているからこそできる総合的な健康教室である。他の施設や自治体において、同様の健康教室を実施するためには、専門的な指導者の確保やスタッフの不足、充実した指導内容を維持することは難しいと考えられる。

また、今回は研究目的で教室を実施しているため、参加者の経済的負担が少なかった。しかし、本来ならば教室運営費を参加費から賄うこととなった場合、参加費の金額設定、参加人数の確保など検討すべき課題がある。地域住民も「自分の健康は自分で守る」という意識から、健康へ投資することへの意欲を定着させることも重要である。

教室期間中、参加者数人が欠席がちになったり、ドロップアウトとなった例があった。その理由として、「仕事を始め、忙しくなった」「家庭の都合(孫の世話、介護など)」「疾病による入院、治療」「関節痛で運動できないため」など様々であった。

このような例の対応策として、たとえ欠席がちになっても参加者を責めず、いつでも教室へ復帰しやすい言葉がけや雰囲気づくりを心がけた。また疾病、特に整形外科疾患については、北御牧村温泉診療所やリハビリテーションセンターに受診を勧め、適切な治療へと導いた例もあった。しかし、中高年女性にとって、自分の身体の体調や心理面の不安定な状態、家庭環境の変化が起こりうる年代でもあり、教室の参加を継続するのが困難になる場合もある。こうした例についても、何らかの形でフォローアップできる体制づくりが今後の課題である。

最後に、指導者の心構えとして「指導者自ら範を示す」ことが健康教育において重要だと感じる。

## 5. まとめ

中高年女性を対象に「温泉利用と生活・運動指

導を組み合わせた総合的健康教育」を実施し、参加者に対して望ましい生活習慣への方向付けを促すことができ、また自らのからだを見つめ直し介護予防の意識を持つ良いきっかけとなった。さらに温泉入浴中の自由な会話が、仲間づくりや意見交換の場となり、参加意欲や健康意識への向上に貢献したのと考えられる。今後、参加者の日常生活に視点を置いた具体的なアプローチをする指導内容プログラムを組み立てていくことで、望ましい生活習慣の維持・継続へとつながるものと考えられる。

### ●附記

本研究は、平成15年度厚生労働科学研究事業(がん予防等健康科学総合研究事業)の一環として実施された。

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# Effectiveness of Comprehensive Health Education Combining Hot Spa Bathing and Lifestyle Education in Middle-Aged and Elderly Women: Randomized controlled trial of three- and six-month interventions

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## 中高年女性を対象とした温泉入浴と 生活・運動指導による総合的健康教育 —3ヶ月間と6ヶ月間介入の無作為化比較試験—

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### 抄 録

本研究は、中高年女性を無作為に2群に分けて、それぞれ3ヶ月間及び6ヶ月間の温泉入浴と生活・運動指導による総合的健康教育が、体格、体力、血液性状、膝や腰の疼痛、そして精神心理面にどのような影響を及ぼすかを1年後と6ヶ月後までフォローアップして明らかにすることを目的とした。

中高年女性に対して、週1回、毎回1時間（更衣、洗身含む）の半身浴（ナトリウム塩化物泉、浴槽温度41.5度）と1時間の生活・運動（行動変容のための講義、ウォーキング、リズム運動、

調理実習等）の指導を、温泉入浴指導員や健康運動指導士、栄養士等が行った。6ヶ月群（n=14）は、3ヶ月群（n=19）と同じプログラムを2回ずつ繰り返した。

調査項目は、BMI、有酸素性作業能力として自転車エルゴメータによるPWC75%HRmax、血液性状（総コレステロール、HDLコレステロール、動脈硬化指数、尿酸、HbA1c）、POMS、自己評価式抑うつ尺度、主観的幸福度、膝と腰の疼痛度（VAS）であった。

6ヶ月介入群では、BMIが介入前（26.3±3.5）と比べて、介入終了直後（25.7±3.5）、そし

てフォローアップ6ヶ月後 ( $25.7 \pm 3.3$ ) と有意 ( $p < 0.05$ ) に減少した。また、PWC75%HRmax、HbA1c、腰痛、活気、抑うつ、主観的幸福度においても、6ヶ月のフォローアップ後まで有意 ( $p < 0.05$ ) な向上が認められた。一方、3ヶ月介入群では、終了直後に向上した調査項目もあったが、フォローアップ1年後には、介入前とほぼ同じ程度に戻っていた。フォローアップ後において、両群間に有意な差 ( $p < 0.05$ ) が見られ

たのは、PWC75%HRmax、HbA1c、疲労感であり、すべて6ヶ月介入群の方が良好な結果であった。週1回という頻度の少ない介入では、効果を維持させるためには、3ヶ月以上のより長期間の介入が必要であり、その効果を正しく判定するには、さらに経年的に追跡すべきことが示唆された。

Key words : hot spa, lifestyle education and exercise, middle-aged and elderly women, randomized controlled trial

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## I INTRODUCTION

Hot spas exert a thermal action, an action of hydraulic pressure, a chemical action, and a general conditioning action<sup>1)</sup>, all of which are known to affect humans favorably. Kurabayashi et al<sup>2)</sup> reported that exercise therapy in acid alum springs was effective for the rehabilitation of chronic obstructive pulmonary disease. Tanizaki et al<sup>3,4)</sup> reported that underwater exercise in a hot spa pool improved the ventilatory function of patients with steroid-dependent bronchial asthma. Yokota et al<sup>5)</sup> reported that the underwater exercise improved not only asthma symptoms, but also depression and mental conditions. A recent study by Mitsunobu et al<sup>6)</sup> showed that the effects of spa therapy decreased with increasing levels of bronchial hyperresponsiveness.

Ohtsuka et al<sup>7)</sup> reported that physical exercise in an alkaline simple hot spa pool once or twice (30 minutes) a day for six weeks was effective for improving immunological functions and as a stress relieving action in patients going through rehabilitation of cerebrovascular disease. Nobunaga et al<sup>8)</sup> demonstrated that a long term spa therapy over two weeks was not necessarily required for the QOL to improve, but that a short-stay spa therapy (3-7 days) was sufficient for the improvement.

One report<sup>9)</sup> systematically reviewed six studies on "spa therapy for rheumatic disease patients" in the Cochrane Library, which attaches much importance to the results of randomized control trials (RCTs). The reviewer concluded that "although the affirmative conclusion of each study could not be ignored, the conclusions should be taken with caution since inadequate methodologies, lack of statistical analyses and essential evaluations were found". The accumulation of RCT studies on hot spa is desired, while good results need to be reviewed with skepticism.

Many studies have reported therapy results of ill patients, but few studies have attempted to clarify the effects of hot spa on so-called "relatively healthy people", who have no severe underlying diseases. Uehata et al<sup>10)</sup> reported that, as a result of giving guidance for hot spa bathing, lifestyle education, and physical exercise to men of middle and advanced ages, weight decrease,

lowered blood pressure, and improved metabolism of serum lipids were observed. Kamioka et al<sup>11)</sup> reported that the two-year program for the elderly women of lifestyle education and physical exercise that was centered around underwater exercise in a hot spa pool 15 times a year effectively maintained serum lipid metabolism and mobility, and that the long-term intervention was effective.

Kamioka et al<sup>12)</sup> conducted a medium-term study with women of middle and advanced ages, in which they employed RCT to compare a control group with a 3-month intervention group meeting once a week for hot spa bathing, lifestyle education and physical exercise. They reported that uric acid, arteriosclerotic index, pains in the back, and psychological tension decreased in the intervention group. However, the necessity of further follow-up was implied to determine the persistence of effects and the emergence of new effects.

Therefore, this study attempted to clarify the effects of 3- and 6-month comprehensive health education programs, which were based on hot spa bathing, lifestyle education and physical exercise given once a week, on physique, psychological vigor, blood properties, pains in the knee and back, and mental and psychological aspects of women. We examined middle-aged and elderly women that were randomly divided into two groups and followed up until six months and one year later, respectively.

## II METHODS

### Subjects

Subject recruiting took place at the periodical health checks (health screening) of the village in August-September, 2002 (Fig. 1). Among the 266 women aged from 40 to 69 years who attended the health checks (attendance rate, 24.9%), 56 women volunteered for the study. They were randomly divided into an intervention group (Group I) of 28 subjects and a control group (Group II) of 28 subjects. In survey 1 (3-month intervention), 22 of Group I and 26 of Group II completed the whole term.

After survey 1, all 26 subjects of Group II were transferred to a 6-month intervention group and the members of Group I were left for a follow-up without intervention. Group II was given a 6-month intervention and a 6-month follow up after the completion of intervention (survey 2). There was no control group for survey 2.

Group II was shifted from a control to an intervention group in survey 2 to let every subject participate in the intervention program and receive benefit. Thus, the study design was adopted with maximum consideration on the ethical aspect to obtain understanding and cooperation from the local residents. Written informed consent was obtained from all subjects after a thorough explanation.

### Intervention

In survey 1, which has already been reported by Kamioka et al<sup>12)</sup>, a 2-hour program covering hot spa bathing, life style education and physical exercise was given once a week for 12 weeks (Table 1). The subjects were subjected to half bathing up to the chest in an open-air bath (salt spring, bath

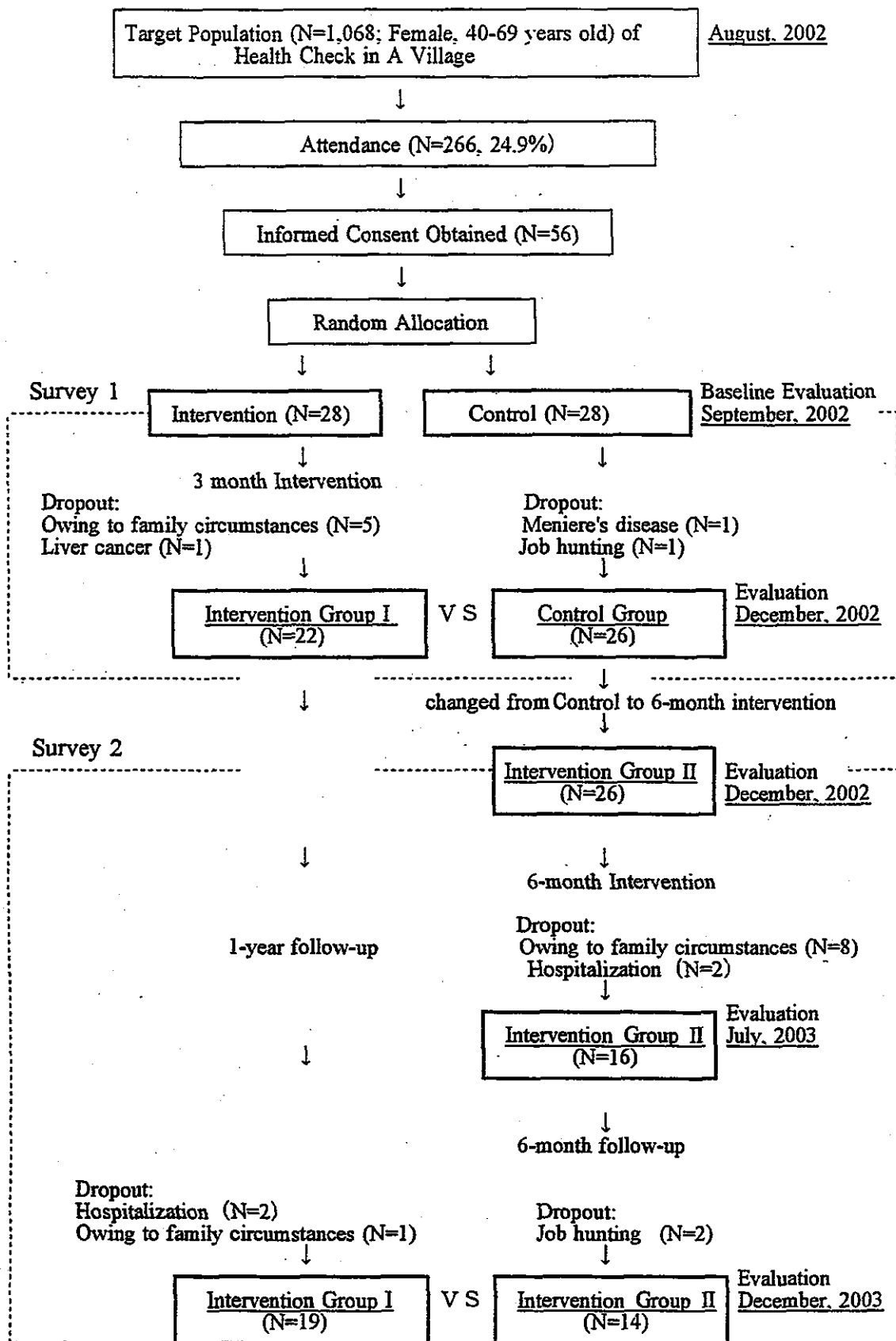


Fig.1 Subject recruitment and research process

Table 1 Protocol for bathing, lifestyle education and exercise

<u>Intervention Group I</u>	
Sessions	Main program (contents)*
---	Introduction and baseline evaluation
1	A lecture on appropriate bathing method and bathing**
2	Stretching, indoor-walking, and bathing
3	Outdoor-walking and bathing
4	A lecture on nutrition and cooking, and bathing
5	Sponge-Tennis (short tennis) and bathing
6	A lecture on menopausal syndrome and bathing
7	Underwater exercise in spa pool (1)
8	Prevention exercise for knees and back pain, and bathing
9	Rhythmic exercise and bathing
10	Underwater exercise in spa pool (2)
11	Outdoor-walking and bathing
---	Evaluation
	..... 1-year follow-up .....
---	Evaluation after 1-year follow-up
Rates of attendance 9.9 (90.0%) $\pm$ 1.4times (range:7-11 times)	
<u>Control and Intervention Group II</u>	
Sessions	Main program (contents)*
---	Introduction and baseline evaluation
	..... No intervention period for 3 months as control group .....
---	Evaluation as control after 3 months / baseline for the next intervention
1	A lecture on appropriate bathing method and bathing**
2	Stretching, indoor-walking, and bathing
3	Sponge-Tennis (short tennis) and bathing (1)
4	A lecture on nutrition and cooking, and bathing
5	Rhythmic exercise and bathing (1)
6	A lecture on menopausal syndrome, and bathing
7	Outdoor-walking and bathing (1)
8	Underwater exercise in spa pool (1)
9	Prevention exercise for knees and back pain, and bathing
10	Underwater exercise in spa pool (2)
---	Evaluation
11	Outdoor-walking and bathing (2)
12	Underwater exercise in spa pool (3)
13	Outdoor-walking and bathing (3)
14	Cooking for calorie control, and bathing
15	Underwater exercise in spa pool (4)
16	Rhythmic exercise and bathing (2)
17	Sponge-Tennis (short tennis) and bathing (2)
18	Ground golf
19	Rhythmic exercise and bathing (3)
20	Underwater exercise in spa pool (4)
---	Evaluation
	..... 6-month follow-up .....
---	Evaluation after 6-month follow-up
Rates of attendance 18.9 (94.5%) $\pm$ 1.2times (range:16-20 times)	

## [note]

\* Staff:spa programmer, public health nurse, dietician, exercise instructor, and physical therapist.

\*\* A salt spring (open-air bath, 41.5 °C).



temperature at 41.5°C ). Bathing time was approximately 20 minutes (2 times for 10 minutes each), which took approximately 60 minutes when including 40 minutes for changing clothes, washing body, and rest (drinking beverages). Two spa programmers prepared a bathing program and gave guidance while bathing together with the subjects each time.

The guidance for lifestyle and physical exercise consisted of lectures (health education) and practices of physical exercise, as shown in Table 1. Each session took approximately 60 minutes. A dietician, a public health nurse, a physical therapist, and an exercise instructor, in addition to the two spa programmers, took part in the lectures and exercise.

On the other hand, the 2-hour program was given once a week for 24 weeks in survey 2 during the period of December 2002 to June 2003. The contents of Table 1 were repeated twice. The method and staff were the same (Table 1).

### Examinations

The evaluation items were blood properties (total cholesterol, HDL cholesterol, arteriolosclerotic index, uric acid, and HbA1c), physical properties (height, weight, and BMI), subjective happiness (Visual analogue scale: VAS), degrees of pains in the knees and back (VAS), and PWC75%HRmax by a bicycle ergometer as aerobic capacity. In addition, POMS (Profile of Mood States)<sup>13,14</sup> and the Self-rating depression scale<sup>15</sup> were used as a questionnaire on the psychological aspects. No blind test was used for the measurements.

The methodology (including a protocol and items of survey and measurement) of this study was approved from the Ethical Board of the Laboratory of Physical Education and Medicine.

### Statistical Analysis

A paired t test and a two sample t test were employed for the comparisons within a group and between groups respectively, with continuous variables in the analysis. Fisher's exact probability test was performed with discrete variables. Differences within and among groups were judged significant when significance levels were not more than 5%. The SPSS 11.0J for Windows was used for the statistical analysis.

## III RESULTS

Table 2 shows the status of underlying diseases. No significant differences were found between the two groups in age, internal diseases, and orthopedic diseases, nor the height, weight, BMI, and PWC75%HRmax at the baseline and the final evaluation.

The 6-month intervention decreased BMI (from 26.3±3.6 to 25.7±3.5) significantly ( $p<0.05$ ) in Group II, and the effect remained (25.7±3.3) even after the completion of the intervention (Table 3).

In Group I, PWC75%HRmax increased significantly (from 63.8±17.1W to 69.8±19.8W,  $p<0.05$ ) by the intervention, but declined again at the 1-year follow-up. In Group II, PWC75%HRmax increased significantly (from 63.7±17.1W to 82.5±17.5W,  $p<0.01$ ) by the intervention, and remained high (78.9±18.8W) even at the 6-month follow-up. The value was significantly high

Table 2 Clinical characteristics of subjects

Baseline	Intervention group I	Control / Intervention groupII
N	22	26
Age (mean $\pm$ SD)	60.0 $\pm$ 8.6	58.4 $\pm$ 6.8 ns
Medical history (Internal medicine)		
Hyperlipidemia	6(27.3%)	3(11.5%) ns
Hypertension	5(22.7%)	7(26.9%) ns
Diabetes	1(4.6%)	0(0%) ns
Medical history (Orthopedics)		
Knee OA	3(13.6%)	4(15.4%) ns
Lumbar spine OA	1(4.6%)	0(0%) ns
Osteoporosis	0(0%)	1(3.8%) ns
Final evaluation	Intervention group I	Intervention groupII
N	19	14
Age (mean $\pm$ SD)	61.6 $\pm$ 7.9	61.4 $\pm$ 7.4 ns
Medical history (Internal medicine)		
Hyperlipidemia	5(26.3%)	2(14.3%) ns
Hypertension	5(26.3%)	5(35.7%) ns
Diabetes	1(5.3%)	0(0%) ns
Medical history (Orthopedics)		
Knee OA	3(15.8%)	1(7.1%) ns
Lumbar spine OA	1(5.3%)	0(0%) ns
Osteoporosis	0(0%)	0(0%) ns

## [note]

Prevalence (rate). ns: not significant, Two sample t test for continuous variable and Fisher's exact test for categorical variables.

( $p < 0.05$ ) compared with that of Group I (66.9 $\pm$ 14.3W).

Table 4 shows the results of the blood properties. In Group II, HbA1c decreased significantly (from 5.38 $\pm$ 0.29% to 5.11 $\pm$ 0.26%) by the intervention, and remained low at the follow up (5.18 $\pm$ 0.24%). The value was significantly low compared with that of Group I (5.46 $\pm$ 0.62%).

Table 5 shows the results of the subjective happiness and the subjective pains in knee and back. In Group II, subjective happiness increased significantly (from 66.8 $\pm$ 15.0% to 75.4 $\pm$ 13.0%,  $p < 0.05$ ). Pains in the back decreased significantly (from 26.2 $\pm$ 20.1% to 17.7 $\pm$ 19.2%,  $p < 0.05$ ), with persistent effect (17.3 $\pm$ 21.1%). In Group I, pains in the back were significantly alleviated immediately after the intervention (from 23.5 $\pm$ 28.4% to 14.2 $\pm$ 21.5%), but tended to return to the baseline level one year later.

Table 6 shows shifts in mental and psychological conditions. In Group II, "vigor" increased significantly (from 55.4 $\pm$ 6.3 to 60.3 $\pm$ 8.3) by the intervention, and the self-rating depression scale declined significantly (from 32.5 $\pm$ 6.1pts to 27.2 $\pm$ 6.2pts,  $p < 0.05$ ) compared with the baseline. Fatigue was significantly higher in Group I than in Group II at the follow-up.

No subjects complained of pains or sick feelings during the entire program, including the measurement.

Table 3 Effect of intervention on physical characteristics and aerobic working capacity

	Intervention group I (n=19)				Control/Intervention group II (n=14)				Difference between two groups
	Baseline	After 3 mo.	After 1 y. follow-up	Baseline	Follow-up	After 6 mo.	After 6 mo. follow-up		
Height (cm)	152.4 ± 5.6	152.3 ± 5.6	152.4 ± 5.7	152.4 ± 4.6	152.5 ± 4.8	152.4 ± 4.8	152.4 ± 4.9	ns for all pairs	
Weight (kg)	56.8 ± 7.7	56.3 ± 7.9	57.5 ± 8.4	60.4 ± 7.5	61.6 ± 10.3	60.3 ± 10.2	59.7 ± 4.9	ns for all pairs	
BMI	24.4 ± 2.8	24.2 <sup>*</sup> ± 3.1	24.8 ± 3.2	26.1 ± 2.9	26.3 <sup>b</sup> ± 3.6	25.7 ± 3.5	25.7 ± 3.3	p<0.05 between a and b	
PWC 75%HRmax (w)	63.8 ± 17.1	69.8 ± 19.8	66.9 <sup>c</sup> ± 14.3	63.7 ± 17.1	68.0 ± 16.4	82.5 ± 17.5	78.9 <sup>d</sup> ± 18.8	p<0.05 between c and d	

[ note ]

Value: mean ± SD. Two sample t test of differences between two groups. Paired t test of difference within group. ns not significant \* p&lt;0.05 \*\* p&lt;0.01.

Table 4 Effect of intervention on blood profile

	Intervention group I (n=19)				Control / Intervention group II (n=14)				Difference between two groups
	Baseline	After 3 mo.	After 1 y. follow-up	Baseline	Follow-up	After 6 mo.	After 6 mo. follow-up		
Total cholesterol (mg/dl)	213.3 ± 33.3	207.3 ± 30.1	216.4 ± 43.4	226.1 ± 35.3	223.9 ± 35.6	225.4 ± 32.9	228.9 ± 28.6	ns for all pairs	
HDL cholesterol (mg/dl)	57.3 ± 11.3	58.1 ± 11.4	57.6 ± 12.7	59.0 ± 11.9	56.0 ± 11.8	56.1 ± 10.0	56.3 ± 11.0	ns for all pairs	
AI	2.86 ± 0.90	2.68 ± 0.83	2.88 ± 0.98	3.01 ± 1.19	3.17 ± 1.15	3.25 ± 1.16	3.18 ± 0.89	ns for all pairs	
Uric acid (mg/dl)	4.43 ± 1.14	4.14 ± 1.12	4.25 ± 1.20	4.54 ± 0.63	4.56 ± 0.69	4.27 ± 0.76	4.26 ± 0.96	ns for all pairs	
HbA1c (%)	5.34 ± 0.60	5.50 ± 0.58	5.46 <sup>a</sup> ± 0.62	5.29 ± 0.23	5.38 ± 0.29	5.11 ± 0.26	5.18 <sup>b</sup> ± 0.24	p<0.05 between a and b	

[ note ]

Value: mean ± SD. AI(Arteriosclerotic index): (Total cholesterol - HDL cholesterol) / HDL cholesterol. Two sample t test of differences between two groups. Paired t test of difference within group. ns not significant \* p&lt;0.05 \*\* p&lt;0.01.

Table 5 Effect of rates of subjective happiness and pain (knee and back)

	Intervention group I (n=19)				Control / Intervention group II (n=14)				Difference between two groups
	Baseline	After 3 mo.	After 1 y. follow-up	Baseline	Follow-up	After 6 mo.	After 6 mo. follow-up		
Subjective happiness* (%)	68.7 ± 11.8	71.0 ± 16.0	67.5 ± 18.8	66.8 ± 15.0	68.1 ± 17.3	69.8 ± 17.2	75.4 ± 13.0	ns for all pairs	
Knee pain (%)**	17.2 ± 19.8	16.6 ± 25.6	15.6 ± 16.9	23.0 ± 24.1	23.3 ± 21.1	24.0 ± 25.7	14.2 ± 17.9	ns for all pairs	
Back pain (%)**	23.5 ± 28.4	14.2 <sup>*</sup> ± 21.5	20.5 ± 27.3	24.6 ± 23.0	26.2 <sup>b</sup> ± 20.1	17.7 ± 19.2	17.3 ± 21.1	p<0.05 between a and b	

[ note ]

Value (Visual Analogue Scale): mean ± SD. \* 100%: maximal happiness, 0%: maximal unhappiness. \*\* 100%: maximal pain, 0%: no pain. Two sample t test of differences between two groups. Paired t test of difference within group. Tested after root transform of knee and back pain (VAS) ns not significant.

Table 6 Psychological tests

	Intervention group I (n=19)				Control / Intervention group II (n=14)				Difference between two groups
	Baseline	After 3 mo.	After 1 y. follow-up	Baseline	Follow-up	After 6 mo.	After 6 mo. follow-up		
POMS(T-score)									
Tension	45.3 ± 6.3	43.2 ± 6.0	—	47.2 ± 6.9	47.7 ± 6.8	44.3 ± 5.3	44.9 ± 4.6	44.1 ± 6.0	ns for all pairs
Depression	46.3 ± 6.1	46.0 ± 5.1	—	49.8 ± 8.9	47.3 ± 4.8	47.4 ± 4.6	46.1 ± 5.0	45.8 ± 5.5	ns for all pairs
Anger	45.1 ± 6.6	44.3 ± 5.5	—	46.6 ± 6.2	46.7 ± 5.4	46.3 ± 5.1	44.4 ± 4.0	45.7 ± 6.1	ns for all pairs
Vigor	52.3 ± 10.5	54.1 ± 8.1	—	52.7 ± 10.5	55.7 ± 7.6	55.4 ± 6.3	60.3 ± 8.3	56.8 ± 8.3	ns for all pairs
Fatigue	44.2 ± 6.0	43.5 ± 5.8	—	47.9 <sup>a</sup> ± 7.6	44.7 ± 6.3	45.2 ± 8.3	42.6 ± 5.0	42.3 <sup>b</sup> ± 6.9	p<0.05 between a and b
Confusion	45.9 ± 7.5	45.2 ± 5.8	—	49.5 ± 7.8	49.5 ± 6.8	47.3 ± 6.8	45.4 ± 5.9	45.6 ± 6.6	ns for all pairs
Self-rating depression scale (pts)	31.8 ± 7.5	29.8 ± 5.6	—	32.1 ± 6.3	32.5 ± 6.1	32.1 ± 6.3	29.7 ± 6.4	27.2 ± 6.2	ns for all pairs

[ note ]

Value: mean ± SD. Two sample t test of differences between two groups. Paired t test of difference within group. ns not significant \* p&lt;0.05.

## IV DISCUSSION

The subjects were recruited from those who underwent health checks in the municipality and were divided randomly into two groups. No significant differences were found between the two groups in any baseline values of age, underlying diseases, physical properties, blood properties, and mental and psychological conditions. Therefore, the comparison of the two groups was assumed to be valid as study design.

Group I of the 3-month intervention yielded good results in aerobic capacity, uric acid in serum, pains in the back, and tension immediately after the intervention, but the values tended to return to baseline level at 1-year follow-up. This indicates that the 2-hour intervention once a week for three months may not be sufficient.

Short-term intervention, such as once a week for three months, is an easy pattern to conduct in a health workshop for residents by the municipality. However, the above negative results of such pattern provide a valuable indication for the health administration policies (to prepare more effective workshop). It also indicates the necessity to examine the outcome of a more frequent intervention that is more than once a week for a certain time.

In Group II of the 6-month intervention, on the other hand, effects persisted in subjective happiness, HbA1c, aerobic capacity, pains in the back, and depression even at the 6-month follow-up. Very high attendance rate (94.5%) suggests the changes in the subjects' daily activity. Considering that one half of the intervention period was during the cold winter of Nagano Prefecture, compliance level was presumably high. The good mental and psychological conditions also support this fact<sup>5)</sup>. However, further follow-up study is necessary to correctly evaluate the effects of once-a-week intervention for six months.

Green et al<sup>16)</sup> divided patients with arthrosis deformans of the hip joint into two groups, a group

of underwater exercise and a home exercise, to study the ranges of joint motion and muscle strength. No significant differences were found between the two groups. In the same study, an essential note on exercise implementation that a "high compliance is essential for home exercise". In the present study, "bathing together every time" created good communications among the participants, which may have contributed to the maintenance of attendance. It is often difficult to continue rehabilitation or physical exercise for therapeutic reasons or improving body functions to an individual, a "synergistic effect" of a group approach is considerably influential.

Pains in the back were significantly alleviated in the 6-month intervention group in the present study. Gerhard et al<sup>17)</sup> conducted a monthly survey on mood and pains in 268 women who were treated for non-inflammatory chronic pains in the back and arthralgia at a hot spa clinic in Austria. They reported that good mood and an relief of pains were observed in the spring and autumn, and that temperature, pains, and mood are interrelated. In the present study, both follow-up evaluations made in May and December demonstrated positive effects. Taking into account the low temperature of winter as a seasonal factor, the effects in Group II, which underwent intervention during the winter, may be higher than the indicated values.

In this study, subjects first underwent lifestyle education and physical exercise for 60min before taking bath in an open-air hot salt spring for 60min including time for changing clothes and washing the body. Relatively vigorous women of middle and advanced ages prefer bathing after physical exercise in practical hot spa bathing in general. On the contrary, Horikiri et al<sup>18)</sup> reported that "elderly people have more improved exercise tolerance after bathing". From the viewpoint of nursing care and illness prevention, the practice of light physical exercise (e.g. stretching) after bathing may be more appropriate for somewhat frail elderly. Further research on suitable intervention methods that is in line with ADL, including timing of bathing, is an important issue for building health with hot spa bathing.

The present study was spread over two years from the baseline to the follow-up. Twelve subjects dropped out in Group II during the process. It is important to determine the reasons for exiting in order for the health administration to examine the methods of intervention. The dropouts were asked for the reasons verbally if possible, or in a written note by postal mail if verbal communication was difficult.

The reasons for dropping out included "emergence of new roles at home to take care of the more elderly or grandchildren", "getting a job", "hospitalization for an aggravated underlying disease" and "malignant tumor found". No subject dropped out because of dissatisfaction with this study. The average age at the start of the intervention in Group II was  $58.4 \pm 6.8$ y, which is one of the major transitional periods in life stage, where preparation for further aging and shifts in the present family relationships take place. As a result, the number of subjects decreased. This may indicate a problem of long-term intervention (e.g. once a week for longer than six months) that tends to yield better effects, but is likely to have more dropouts.

This study concerns effects of intervention with a combination of hot spa bathing, lifestyle education and physical exercise for women of middle and advanced ages, but has no control group of

hot spa bathing alone. Therefore, specific effects of the hot spa bathing can not be determined, which limits the scope of discussion. The significant effects of the 6-month intervention, in particular, should be understood as an achievement from the comprehensive health education programs including the utilization of hot spa bathing.

It is assumed that combining health education programs and imposing a certain active task on participants, as in the present study, is essential. Passive hot spa bathing alone would be difficult as a health policy for municipalities. The accumulation of RCT studies with diverse and realistic designs based on behavioral science is expected to clarify evidence for the effects of hot spa bathing.

The present study was an irregular randomized controlled trial, in which the control group was turned into an intervention group half way through the study period. However, it was successful in presenting that the once-a-week intervention for six months was likely to produce more effects than that of three months. Another limit of evaluation is the difference of follow-up term between the two groups (6 months and 1 year). Both groups underwent final evaluation in December, 2003. This was designed so to avoid seasonal effects (levels of physical activity, appetite, etc.) and to set the same baseline time for both groups. More precisely, it is necessary to reevaluate the intervention Group II at 1-year follow-up and compare with the results of Group I. Even further follow-up studies at one and two years later are future tasks.

## V CONCLUSION

Effects on mood, aerobic capacity, blood properties, and pains in the back manifested in the group of 2-hour intervention once a week for three months immediately after the intervention period, but the effects did not persist when examined one year later. On the other hand, for the same 2-hour intervention program once a week for six months, following items remained significantly improved even until six months after the completion of the intervention; BMI, aerobic capacity, HbA1c, pains in the back, and subjective happiness.

The intervention of low frequency, once a week, required an intervention period longer than three months to maintain its effects. Effects should be traced over years for a correct evaluation of its persistence.

## Acknowledgment

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## Summary

This study attempted to clarify the effects of 3- and 6-month comprehensive health education programs based on hot spa bathing, lifestyle education and physical exercise on physique, psychological vigor, blood properties, pains in the knee and back, and mental and psychological aspects of women. We examined middle-aged and elderly women who were randomly divided into two groups and followed up until six months and one year later, respectively.

Spa programmers, an exercise instructor, and a dietician instructed subjects to one hour of lifestyle education and physical exercise (lecture on behavior modification, walking, rhythmic exercise, cooking practice, etc.) and one hour (including time for changing clothes and washing body) of a

half bath (salt spring, temperature at 41.5) once a week. The program for the 3-month group (n=19) was repeated in the 6-month group (n=14).

The evaluation items were BMI, PWC75%HRmax (by a bicycle ergometer as aerobic capacity), blood properties (total cholesterol, HDL cholesterol, arteriolosclerotic index, uric acid, and HbA1c), profile of mood states, self-rating depression scale, subjective happiness, and pains in the knee and back.

Compared with pre-intervention data ( $26.3 \pm 3.6$ ), the BMI decreased significantly ( $p < 0.05$ ) immediately after the intervention ( $25.7 \pm 3.5$ ) and at the follow up six months later ( $25.7 \pm 3.3$ ) in the group of 6-month intervention. In addition, the PWC75%HRmax, HbA1c, pains in the back, vigor, depression, and subjective happiness remained significantly improved ( $p < 0.05$ ), as measured at the 6-month follow-up. On the other hand, some of the items improved in the 3-month intervention group immediately after the intervention, but returned to nearly the same levels as those before intervention at the 1-year follow-up. Significant differences ( $p < 0.05$ ) were found in the PWC75%HRmax, HbA1c, and fatigue between the two groups, all of which were improved in the 6-month intervention group.

These results suggest that a low frequency, once-a-week intervention requires duration longer than three months to maintain the effects, and that the effects should be monitored over years for a correct assessment.



# みんかつ

No.178

11月号

## 健康テーマの地域産業ネットワーク

特集1

### 泉質のなぞを解く

自分に合う温泉がわかる「温泉分析書」解読法

特集2

### サプリメント（栄養補助食品）

を正しく知って  
摂取するためのQ&A

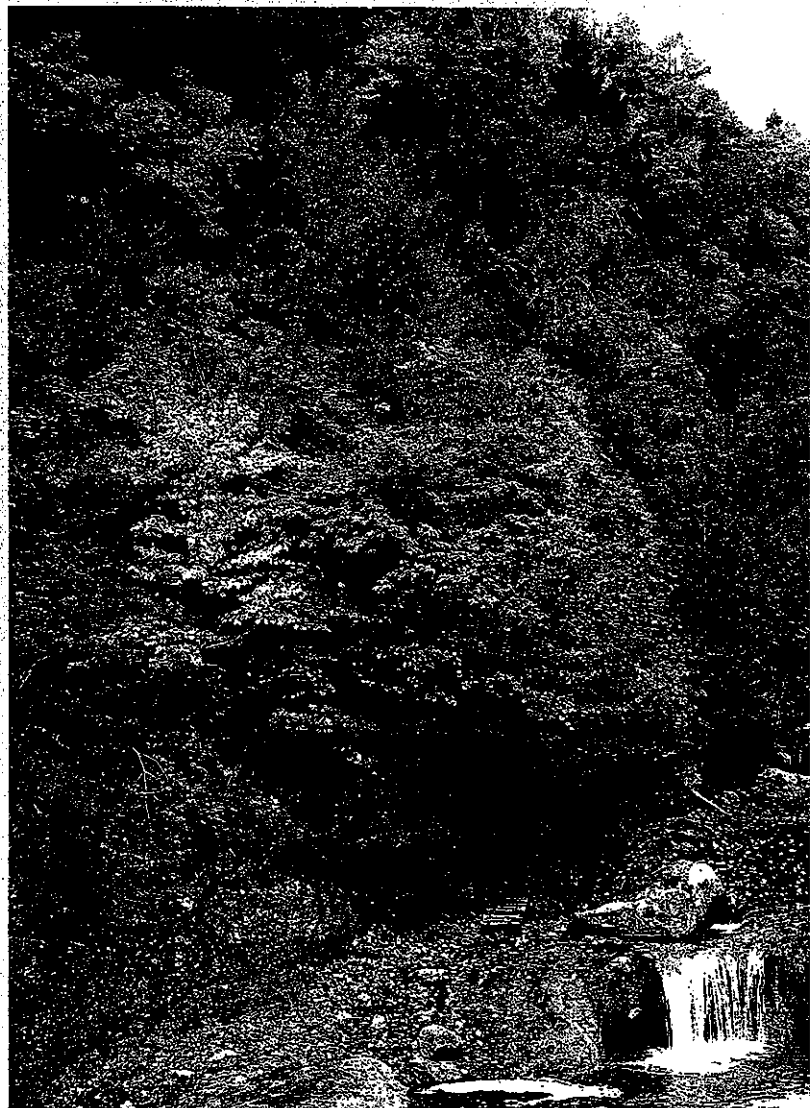
筋肉・関節の  
「痛み」の湯治

コレステロール、  
中性脂肪の多い方の  
献立プラン

ホリスティック医学  
からみた温泉療法

草原・湖・溪流の  
澄み切った大気を満喫する

高原浴の郷  
蓼科高原・茅野



# 温泉入浴と運動・生活指導で科学的な研



ケアポートみまき  
保健・福祉・医療を統合した総合施設。身体教育医学研究所はこの中にある

容で、こちらも各回約60分行いました。

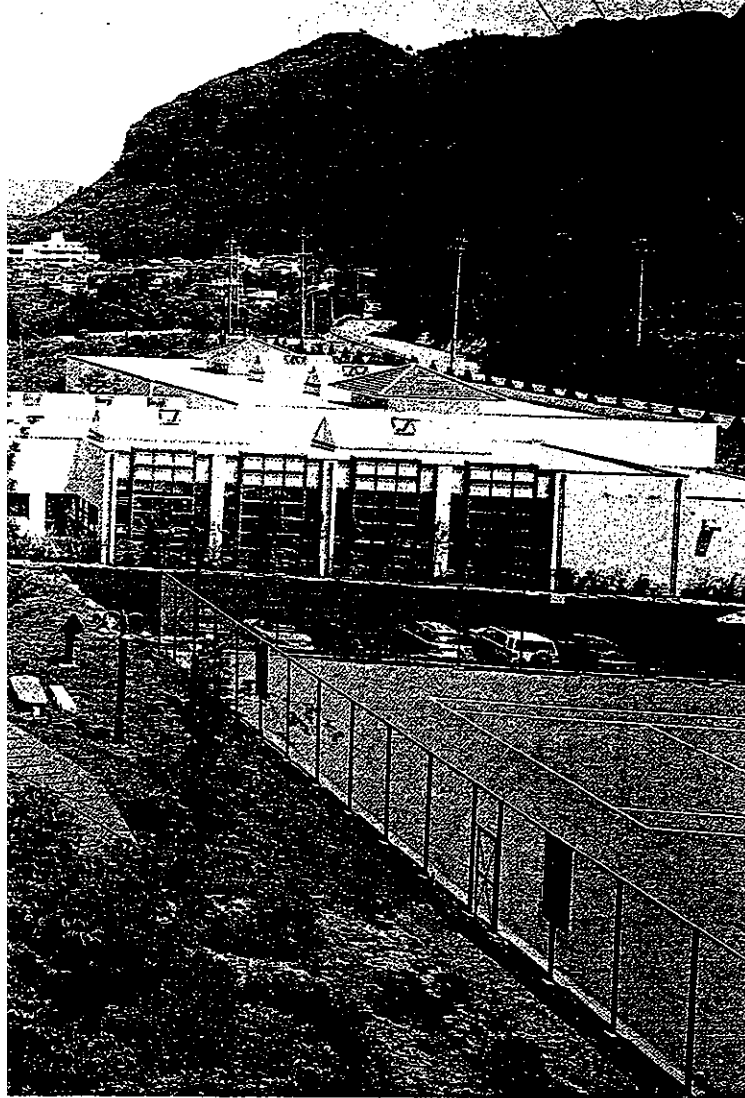
こうして、週1回、11回にわたって温泉入浴と生活・運動指導を実施したところ、指導したグループは、しなかったグループに比べて、健康の指標となる、さまざまなデータが改善を見せたのです。

## 動脈硬化予防や腰痛対策効果が判明

まず、尿酸値と動脈硬化指数（コレステロール値から導き出される指数）が改善しています。さらに、腰痛を訴える人の割合も減少。精神心理的には緊張の低下が認められます。また、健康的な生活習慣を行う人の割合も増えていきます。

体脂肪率は、指導グループではほとんど変化がなかったのに、何もしなかったグループでは明らかに増加しています。上岡氏の考察によると、これは研究を実施したのが秋から冬に向かう時期だったからだと考えられます。つまり、気温の低下とともに体を動かす機

# 実際に健康づくりができることが 究でも証明された



健康づくりで知られる長野県北御牧村にある  
身体教育医学研究所で、  
温泉入浴と運動・生活指導を組み合わせ  
行った場合の健康増進効果を検証する  
研究が行われました。  
その結果、動脈硬化、中性脂肪、  
腰痛などに確かな効果があることが判明。  
温泉の健康効果がここでも確認されました。

## 露天風呂の入浴と 講習・実習を実施

温泉入浴と運動・生活指導を3  
カ月くらい続ければ、健康増進効  
果が着実にあがる——このような  
研究結果が発表されて話題を呼ん  
でいます。これまで、健常者を対  
象とした温泉効果の研究は少な  
く、中高年男性を対象にして連続

6日間行われた研究などが発表さ  
れてはいますが、対象が無作為に  
割付された中高年女性で、週1回  
ずつ温泉入浴と指導を行う、とい  
う設定の研究はこれが初めて。あ  
らためて、運動や栄養指導と組み  
合わせた温泉保養の有効性が証明  
された結果になりました。

この研究を発表したのは、長野  
県北御牧村にある身体教育医学研  
究所の上岡洋晴研究部長を主任研  
究者とする研究チーム。研究への  
協力に同意した40〜69歳の女性  
を、無作為に28名ずつの2グルー  
プに分け、片方に温泉入浴と生  
活・運動指導を行って、両方のグ  
ループを比較してみたのです。な  
お、最終的なサンプル数は、入  
浴・指導を行ったグループは22  
名、何も行わなかったグループは  
26名でした。

入浴は、事前に作成した入浴プ  
ログラムに基づき、浴槽は温度  
41・5℃の露天風呂を使用。更衣、  
洗身、休憩（水分補給）と入浴  
（胸部までの半身浴10分間を2回）  
で約60分、それに生活・運動指導  
を表（64ページ参照）のような内

# 身体教育医学 研究所

長野県北御牧村は、ひとりあたりの老人医療費が、平成6年度から9年度にかけて全国で最も低下した自治体として知られています（国民健康保険中央会の統計による）。その医療費削減に大きな貢献をしたのが、平成7年に日本財団のモデル事業として北御牧村に設立された「ケアポートみまき」です。

約1万5000㎡の敷地に、全室個室の特別養護老人ホーム、デイサービスセンター、村営温泉診療所、温泉プールやジャグジーの整備された「温泉アクティブセンター」などが配置され、村の総合保健・福祉施設になっています。身体教育医学研究所は、このケアポートみまき内に平成11年に設立されました。

武藤芳照・東京大学大学院教授が運営委員長を務め、武藤ゼミのメンバーが多数、研究員として参加しています。すべての人が生涯にわたって正しく、健やかに「からだを育む」ことができるように、その手だてを研究しており、子どもや高齢者の運動あそびの開発、健脚度の測定・評価、水中運動の指導、転倒・介護予防のための指導・研究などの事業を行っています。

〒389-0402

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URL <http://www.shintai-mimaki.org/>



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主な研究

高齢者の転倒予防に関する研究。中高年者の健康づくりに関する研究。



## ■被験者の測定データ（平均値）

温泉入浴と運動・生活指  
したグループ（22名）

	実験前	実験後
総コレステロール (mg/dl)	213	207
中性脂肪 (mg/dl)	149	117
HDLコレステロール (mg/dl)	57.3	58.1
動脈硬化指数	2.85	2.61
尿酸 (mg/dl)	4.4	4.1
ヘモグロビンA1C (%)	5.3	5.5
体脂肪率 (%)	28.3	28.4
膝痛 (%)	17.2	16.6
腰痛 (%)	23.5	14.2
緊張	45.3	43.2
抑うつ	46.3	46
疲労	44.2	43.5

研究結果の表から一部抜粋して作成。各数値はグループ全員の平均値。

「全国を共に正しく遊ぼう」と思っています。これを健康づくりに生かさない手はありません。『館と鞭』という言葉は、これからは『温泉と健康教育』に置き換えられるかもしれません。

なお、今後は研究のサンプル群を増やして、温泉の効果をより明らかにするとともに、今回実施した人たちの追跡調査も行い、経時変化も明らかにしていきたいと考えています。